SECTION C (STATISTICS)
IF THIS SECTION IS CHOSEN, THEN SECTION B MAY NOT BE CHOSEN
(ANSWER TWO QUESTIONS)

9. The marks obtained by 50 candidates in an examination were grouped into classes and the corresponding frequencies listed in the following table.

Marks (x)	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
No. of cand. (f)	3	5	6	8	9	12	5	2		1

Draw the cumulative frequency graph for the above data. Hence, from your graph, find

(a) the median mark.
(b) the pass mark if 60% of the candidates were to pass successful.
(c) the number of candidates who would fail if more than 25 marks were required for a pass.
(d) Calculate the mean mark of the distribution.

10. (i) The marks scored by 120 students in a Mathematics examination, marked on 20, is given in the table following:

Marks (x)	5	6	7	8	9	10	11	12
No. of students (f)	13	14	18	21	22	19	8	6

Calculate,
(a) the mean.
(b) the variance, of the distribution.

(ii) Given the set $X = \{2,4,5,7,10,13,15\}$ determine,
(a) the mean and variance of set X.

Given that $y = px + q$, $p > 0$, and that the mean of y is 73 and the variance of y is 180,
(b) determine, the values of the constants p and q.
(c) write down the elements of the set Y.

11. (i) A bag contains 4 white beads and 6 blue beads. Two beads are drawn at random, from the bag in succession and without replacement.
Find the probability that
(a) the first bead drawn is white.
(b) one bead drawn is white,
(c) the second bead drawn is blue.

(ii) There are two boxes X and Y containing black and red balls. Box X contains 4 black and 3 red balls while Box Y contains 3 black and 5 red balls.
A box is chosen at random and a ball is drawn from it.
(a) Draw a tree diagram to show all the possible outcomes.
From the tree diagram, find the probability that
(b) a black ball is drawn from box X,
(c) a black ball is drawn from the boxes.

SECTION B (MECHANICS)
IF THIS SECTION IS CHOSEN, THEN SECTION C MAY NOT BE CHOSEN
(ANSWER ANY TWO QUESTIONS)

6 (i) Two particles A and B are moving in the plane of the coordinate axes OX and OY. At time t seconds, the position vectors of A and B are $(3t - 1)\mathbf{i} + 2t^2\mathbf{j}$ and $(2\mathbf{i} + t^2\mathbf{j})$, respectively.

(a) Calculate the distance between A and B when $t = 2$.

(b) Calculate the magnitude of the velocity of B when $t = 2$ and show that the acceleration is constant.

(ii) A particle moves in a straight line with acceleration $(2t + 4)\text{ms}^{-2}$. Initially the particle is at rest at the point O and two seconds later it has a velocity of 2ms^{-1}.
Find, in terms of t,
(a) the velocity of the particle,
(b) the displacement of the particle from O,
(c) hence, find the distance covered by the particle from the point O when $t = 4$.

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7. (i) A particle, of mass 2kg, lies on a smooth plane which is inclined at 30° to the horizontal and is connected by a light inextensible string which passes over a light smooth fixed pulley, to another particle, of mass of 3kg, hanging freely at the edge of the plane. The system is released from rest, with the string taut.
(a) Draw a diagram showing the forces acting on the particle.
Find,
(b) the acceleration of the particles,
(c) the tension in the string,
(d) the force exerted on the pulley by the string.

(ii) A particle of weight 4N is attached to one end of a string 1.5m long whose other end is fastened to a fixed point A. The particle is pulled aside by a horizontal force FN until it is displaced 0.5m horizontally. Find:
(a) the tension in the string,
(b) the magnitude of the force F.

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8. (i) A car has a maximum power of 15kw. Given that the maximum speed of the car on a level road is 20ms^{-1},
(a) Calculate, in N, the total resistance to the motion of the car, at this speed.

Given that the engine is still working at the same rate and that the resistance remains unchanged,
(b) calculate, when the speed of the car is 5ms^{-1}, the acceleration of the car up a plane inclined at angle θ to the horizontal, where $\sin\theta = \frac{1}{20}$.

(ii) A particle A of mass $2m$ moving with speed $2v$ collides head on with another particle B of mass m moving with speed u.

Given that the particles stick together on impact, find
(a) their combined speed in terms of u.
(b) the loss in kinetic energy after the impact.
